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TUTTLE, ARTHUR S.
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UHLER, WILLIAM DAVID.
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WAGONER, LUTHER.
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WASHBURN, FRANK SHERMAN.
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WATSON, WINSLOW BARNES.
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WAY, ROBERT ATTWELL.
Memoir of. 1716.

WEIR, M. W.
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WELTY, H. T.
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WHEELER, EDGAR TRUE.
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WHIPPLE, GEORGE C.
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WHISTLER, THOMAS DELANO.
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WHITE, LAZARUS.
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WHITE, LINN.
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WICKENDEN, W. E.
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WILMOT, SYDNEY.
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WILSON, WILLIAM HASELL.
Memoir of. 1623.

WIMMER, SEBASTIAN.
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WING, CHARLES B.
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WOODRUFF, GLENN B.
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WORTHINGTON, B. A.
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WRIGHT, CHARLES ALBERT LORING.
Memoir of. 1725.

YOUNG, C. R.
Locomotive loadings for railway bridges. 679.